

4-4

Reading to Learn Mathematics

Proving Congruence—SSS, SAS

Pre-Activity How do land surveyors use congruent triangles?

Read the introduction to Lesson 4-4 at the top of page 200 in your textbook.

Why do you think that land surveyors would use congruent right triangles rather than other congruent triangles to establish property boundaries?

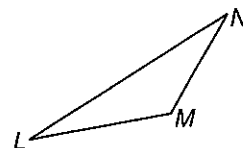
Reading the Lesson

1. Refer to the figure.

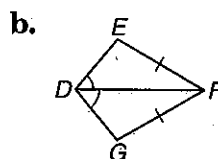
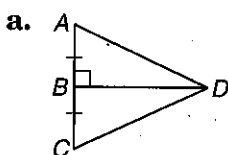
a. Name the sides of $\triangle LMN$ for which $\angle L$ is the included angle.

b. Name the sides of $\triangle LMN$ for which $\angle N$ is the included angle.

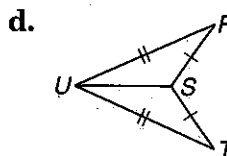
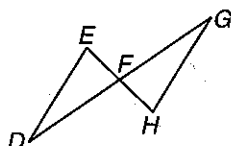
c. Name the sides of $\triangle LMN$ for which $\angle M$ is the included angle.



2. Determine whether you have enough information to prove that the two triangles in each figure are congruent. If so, write a congruence statement and name the congruence postulate that you would use. If not, write *not possible*.



c. \overline{EH} and \overline{DG} bisect each other.



Helping You Remember

3. Find three words that explain what it means to say that two triangles are congruent and that can help you recall the meaning of the SSS Postulate.

4-5

Reading to Learn Mathematics

Proving Congruence—ASA, AAS

Pre-Activity How are congruent triangles used in construction?

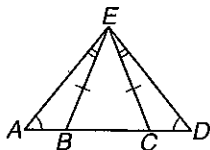
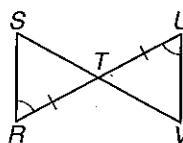
Read the introduction to Lesson 4-5 at the top of page 207 in your textbook.

Which of the triangles in the photograph in your textbook appear to be congruent?

Reading the Lesson

1. Explain in your own words the difference between how the ASA Postulate and the AAS Theorem are used to prove that two triangles are congruent.
2. Which of the following conditions are sufficient to prove that two triangles are congruent?
 - A. Two sides of one triangle are congruent to two sides of the other triangle.
 - B. The three sides of one triangles are congruent to the three sides of the other triangle.
 - C. The three angles of one triangle are congruent to the three angles of the other triangle.
 - D. All six corresponding parts of two triangles are congruent.
 - E. Two angles and the included side of one triangle are congruent to two sides and the included angle of the other triangle.
 - F. Two sides and a nonincluded angle of one triangle are congruent to two sides and a nonincluded angle of the other triangle.
 - G. Two angles and a nonincluded side of one triangle are congruent to two angles and the corresponding nonincluded side of the other triangle.
 - H. Two sides and the included angle of one triangle are congruent to two sides and the included angle of the other triangle.
 - I. Two angles and a nonincluded side of one triangle are congruent to two angles and a nonincluded side of the other triangle.
3. Determine whether you have enough information to prove that the two triangles in each figure are congruent. If so, write a congruence statement and name the congruence postulate or theorem that you would use. If not, write *not possible*.

a.

b. T is the midpoint of \overline{RU} .**Helping You Remember**

4. A good way to remember mathematical ideas is to summarize them in a general statement. If you want to prove triangles congruent by using three pairs of corresponding parts, what is a good way to remember which combinations of parts will work?

4-6

Reading to Learn Mathematics**Isosceles Triangles****Pre-Activity** How are triangles used in art?

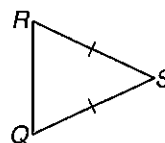
Read the introduction to Lesson 4-6 at the top of page 216 in your textbook.

- Why do you think that isosceles and equilateral triangles are used more often than scalene triangles in art?
- Why might isosceles right triangles be used in art?

Reading the Lesson

1. Refer to the figure.

- What kind of triangle is $\triangle QRS$?
- Name the legs of $\triangle QRS$.
- Name the base of $\triangle QRS$.
- Name the vertex angle of $\triangle QRS$.
- Name the base angles of $\triangle QRS$.



2. Determine whether each statement is *always*, *sometimes*, or *never* true.

- If a triangle has three congruent sides, then it has three congruent angles.
- If a triangle is isosceles, then it is equilateral.
- If a right triangle is isosceles, then it is equilateral.
- The largest angle of an isosceles triangle is obtuse.
- If a right triangle has a 45° angle, then it is isosceles.
- If an isosceles triangle has three acute angles, then it is equilateral.
- The vertex angle of an isosceles triangle is the largest angle of the triangle.

3. Give the measures of the three angles of each triangle.

- an equilateral triangle
- an isosceles right triangle
- an isosceles triangle in which the measure of the vertex angle is 70°
- an isosceles triangle in which the measure of a base angle is 70°
- an isosceles triangle in which the measure of the vertex angle is twice the measure of one of the base angles

Helping You Remember

- If a theorem and its converse are both true, you can often remember them most easily by combining them into an "if-and-only-if" statement. Write such a statement for the Isosceles Triangle Theorem and its converse.

4-7

Reading to Learn Mathematics

Triangles and Coordinate Proof

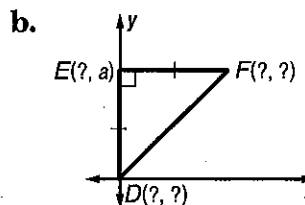
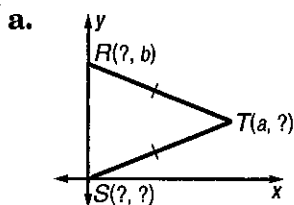
Pre-Activity How can the coordinate plane be useful in proofs?

Read the introduction to Lesson 4-7 at the top of page 222 in your textbook.

From the coordinates of A , B , and C in the drawing in your textbook, what do you know about $\triangle ABC$?

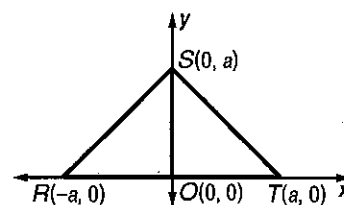
Reading the Lesson

1. Find the missing coordinates of each triangle.



2. Refer to the figure.

- a. Find the slope of \overline{SR} and the slope of \overline{ST} .
- b. Find the product of the slopes of \overline{SR} and \overline{ST} . What does this tell you about \overline{SR} and \overline{ST} ?
- c. What does your answer from part b tell you about $\triangle RST$?
- d. Find SR and ST . What does this tell you about \overline{SR} and \overline{ST} ?
- e. What does your answer from part d tell you about $\triangle RST$?
- f. Combine your answers from parts c and e to describe $\triangle RST$ as completely as possible.
- g. Find $m\angle SRT$ and $m\angle STR$.
- h. Find $m\angle OSR$ and $m\angle OST$.

**Helping You Remember**

3. Many students find it easier to remember mathematical formulas if they can put them into words in a compact way. How can you use this approach to remember the slope and midpoint formulas easily?